REMARKS

Claims 1, 2, 5-26 and 29-50 remain pending in the above-identified application and have been rejected. The drawings have been objected to. Replacement drawings have been filed concurrently herewith. The specification has been amended. Claim 51 has been canceled solely to further the prosecution of this application. Claims 1, 25 and 47 have been amended.

Claims 1, 2, 5-26 and 29-51 stand rejected under 35 U.S.C. § 112, first paragraph as failing to describe the subject matter of these claims in the specification in such as to enable one skilled in the art to make and/or use the invention. Claim 51 has been canceled, and thus the rejection of that claim has been made moot. Specifically, the Office action states that the specification does not provide sufficient guidance on how to fabricate a gas sensor having a catalytic gate-electrode deposited on a semiconductor surface, wherein the sensor is either a HFET, MISFET, MESFET, MOSFET or MISHFET. Furthermore, the drawings have been objected to as not showing a gas sensor having a catalytic gate-electrode deposited on a semiconductor surface, wherein the sensor is either a HFET, MISFET, MESFET, or MISHFET.

Claims 1, 25 and 47 are each directed to a gas sensor device that includes, among other features, "one or more catalytic gate-electrodes contacting" a surface of a semiconductor layer. The recited gas sensor device is "selected from the group consisting of a HFET, a MISFET, a MESFET, a MOSFET, and a MISHFET". Claims 2 and 5-24 depend from claim 1. Claims 26 and 29-46 depend from claim 25. Claim 48 is directed to a gas sensor device that includes, among other features, "an insulating layer" and "one or more catalytic gate-electrodes contacting a surface of said insulating layer". Claims 49 and 50 depend from claim 48.

Applicant has added new figures, specifically FIG. 10 and FIG. 11, which are based upon material present in the specification originally. Applicant has also added two new paragraphs to introduce the new figures, and two other new paragraphs to describe the gas sensor devices illustrated therein. FIG. 10 illustrates a MISHFET including a catalytic gate-electrode 58 with a metal oxide portion 58', which acts as both a catalyst and an insulator, contacting a heterojunction 52 of a semiconductor substrate 50. Applicant believes that FIG. 4 adequately illustrates this arrangement;

however, applicant has included FIG. 10 merely to further clarify information that was originally within the application at filing. Specifically, support existed in the specification as originally filed for the contention that catalytic gate-electrodes could be formed of various layers of catalytic material (See, for example, paragraph [0034]), and support existed in the specification as originally filed for catalytic gate-electrodes formed of certain metal oxides (See, for example, paragraphs [0032] and [0033]). Further, it is a well-known property of certain metal oxides that they can be both catalytic in nature and electronically insulating. See, for example, CRC Handbook of Metal Etchants, CRC Press, Perrin Walker and William H. Tarn (1991). Thus, no new matter has been included in this amendment.

FIG. 11 illustrates either a MISFET or a MOSFET including a catalytic gate-electrode 70 with a metal oxide portion 70', which acts as both a catalyst and an insulator, contacting a semiconductor substrate 64. Applicant believes that FIG. 5 adequately illustrates this arrangement; however, applicant has included FIG. 11 merely to further clarify information that was originally within the application at filing. Specifically, support existed in the specification as originally filed for the contention that catalytic gate-electrodes could be formed of various layers of catalytic material (See, for example, paragraph [0034]), and support existed in the specification as originally filed for catalytic gate-electrodes formed of certain metal oxides (See, for example, paragraphs [0032] and [0033]). Further, it is a well-known property of certain metal oxides that they can be both catalytic in nature and electronically insulating. See, for example, Surface Chemistry and Catalysis, Kluwer Academic/Plenum Publishers, Albert F. Carley, Graham J. Hutchings (Editor), Michael S. Spencer (Editor), Philip R. Davies (Editor), (2002). Thus, no new matter has been included in this amendment.

Further, as the Office action states, FIG. 4 illustrates a HFET, one in which the catalytic gate-electrode 58 is in contact with the heterojunction 52 of the semiconductor substrate 50. Finally, applicant submits that FIG. 5 also illustrates a metal semiconductor field effect transistor (MESFET) in that it illustrates a metallic catalytic gate-electrode 70 contacting a surface of a semiconductor substrate 64. Applicant submits that the application, including the figures, is in full compliance with §112. Applicant further submits that new figures FIG. 10 and 11, along with their

accompanying text, are based upon information originally present in the specification, do not add new matter, and thus are permissible additions to the specification.

Claims 1, 2, 5, 6, 12-15, 17, 18, 20-22, 25, 26, 29, 30, 36-38, 40, 41 and 44 stand rejected under 35 U.S.C. § 102(b) as being anticipated by von Windheim (USPN 5,362,975). Claims 1 and 25 have been amended. Claims 2, 5, 6, 12-15, 17, 18 and 20-22 depend from claim 1, and claims 26, 29, 30, 36-38, 40, 41 and 44 depend from claim 25. Applicant respectfully traverses the rejection.

The von Windheim reference fails to teach or suggest a MOSFET gas sensor device with "a semiconductor layer having a surface" and "one or more catalytic gate-electrodes contacting said surface" as recited in independent claims 1 and 25. Instead, von Windheim refers to a chemical sensor that includes a catalytic gate-electrode 164 contacting a passivation layer 163 (See, for example, FIGS. 17, 18).

Claims 1, 2, 5, 6, 13-15, 17, 20-22, 24, 48 and 49 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Baranzahi. Claim 1 has been amended. Applicant respectfully traverses the rejection.

As noted previously, claims 1 and 48 are each directed to a gas sensor device. The gas sensor device of claim 1 includes, among other features, "one or more catalytic gate-electrodes contacting" a surface of a semiconductor layer. The gas sensor device is "selected from the group consisting of a HFET, a MISFET, a MESFET, a MOSFET, and a MISHFET". Claims 2, 5, 6, 13-15, 17, 20-22 and 24 depend from claim 1. The gas sensor device of claim 48 includes, among other features, "an insulating layer" and "one or more catalytic gate-electrodes contacting a surface of said insulating layer". Claim 49 depends from claim 48.

Baranzahi refers to a gas sensing device that includes a semiconductor 1, an insulator 2, a catalytic metal 3, an intermediate layer 4, and a catalytic layer 5. The catalytic layer 5 serves as a catalytic gate-electrode. The catalytic layer 5 does not contact a surface of the semiconductor 1, nor

does the catalytic layer 5 contact the insulator 2. Therefore, Baranzahi fails to teach or suggest each and every element of claim 1 in that it fails to teach "one or more catalytic gate-electrodes contacting [a semiconductor layer] surface" and each and every element of claim 48 in that it fails to teach "one or more catalytic gate-electrodes contacting a surface of said insulating layer".

Claims 7-10 and 31-34 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of von Windheim '975 and Sibbald. Claims 7-10 depend from claim 1, while claims 31-34 depend from claim 25. Applicant respectfully traverses the rejection.

As noted previously, von Windheim fails to teach or suggest a gas sensor device with "a semiconductor layer having a surface" and "one or more catalytic gate-electrodes contacting said surface" as recited in claims 1 and 25. Sibbald is relied upon in the Office action as teaching the use of osmium, platinum/rhodium, vanadium oxide, or mixtures thereof as a catalytically active metal. Sibbald provides no relevant teaching or suggestion regarding a gas sensor device with "a semiconductor layer having a surface" and "one or more catalytic gate-electrodes contacting said surface".

Claims 11 and 35 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of von Windheim '975 and Onaga. Claim 11 depends from claim 1, while claim 35 depends from claim 25. Applicant respectfully traverses the rejection.

The von Windheim reference, as noted previously, fails to teach or suggest a a gas sensor device with "a semiconductor layer having a surface" and "one or more catalytic gate-electrodes contacting said surface" as recited in claims 1 and 25. Onaga is relied upon in the Office action as teaching the use of $LaNiO_3$ as a metal oxide semiconductor. Onaga provides no relevant teaching or suggestion regarding a a gas sensor device with "a semiconductor layer having a surface" and "one or more catalytic gate-electrodes contacting said surface".

Claims 19, 42 and 47 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of von Windheim '975 and Najafi. Claim 19 depends from claim 1, claim 42 depends from claim 25, and claim 47 is independent in nature. Claim 47 has been amended and

recites, in relevant part, a gas sensor device with "a semiconductor layer having a surface" and "one or more catalytic gate-electrodes contacting said surface". Applicant respectfully traverses the rejection.

The von Windheim reference, as noted previously, fails to teach or suggest a a gas sensor device with "a semiconductor layer having a surface" and "one or more catalytic gate-electrodes contacting said surface" as recited in claims 1, 25 and 47. Najafi is relied upon in the Office action as teaching a flip-chip design for gas microsensors. Najafi provides no relevant teaching or suggestion regarding a gas sensor device with "a semiconductor layer having a surface" and "one or more catalytic gate-electrodes contacting said surface".

Claim 23 stands rejected under 35 U.S.C. § 103 as being unpatentable over the combination of von Windheim '975 and Kang. Claim 23 depends from claim 1. Applicant respectfully traverses the rejection.

The von Windheim reference, as noted previously, fails to teach or suggest a gas sensor device with "a semiconductor layer having a surface" and "one or more catalytic gate-electrodes contacting said surface" as recited in claim 1. Kang is relied upon in the Office action as teaching a FET sensor array. Kang provide no relevant teaching or suggestion regarding a gas sensor device with "a semiconductor layer having a surface" and "one or more catalytic gate-electrodes contacting said surface".

Claims 16 and 51 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Baranzahi and Khan. Claim 16 depends from claim 1. Claim 51 has been canceled, thus rendering this rejection moot as to that claim. Applicant respectfully traverses the rejection as it applies to claim 16.

Baranzahi fails to teach or suggest a gas sensor device with "a semiconductor layer having a surface" and "one or more catalytic gate-electrodes contacting said surface" as recited in claim 1. Khan is relied upon in the Office action as teaching the use of a heterostructure AlGaN layer, and thus, provides no relevant teaching or suggestion pertaining to a gas sensor device with "a

semiconductor layer having a surface" and "one or more catalytic gate-electrodes contacting said surface".

Claims 25, 26, 29, 30, 41, 43 and 46 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Baranzahi and von Windheim '975. Claims 26, 29, 30, 41, 43 and 46 depend from claim 25. Applicant respectfully traverses the rejection.

As noted previously, both Baranzahi and von Windheim '975 fail to teach or suggest a gas sensor device with "a semiconductor layer having a surface" and "one or more catalytic gate-electrodes contacting said surface"as recited in claim 25.

Claim 39 stands rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Baranzahi, von Windheim '975 and Khan. Claim 39 depends from claim 25. Applicant respectfully traverses this rejection.

As noted previously, both Baranzahi and von Windheim '975 fail to teach or suggest a gas sensor device with "a semiconductor layer having a surface" and "one or more catalytic gate-electrodes contacting said surface"as recited in claim 25. Khan is relied upon in the Office action as teaching the use of a heterostructure AlGaN layer, and thus, provides no relevant teaching or suggestion to those of Baranzahi and von Windheim.

For at least the aforementioned reasons, applicant respectfully traverses the rejection of claims 1, 2, 5-26 and 29-50. Withdrawal of the rejections and drawings objections is respectfully requested, and allowance of the currently pending claims is respectfully solicited.

Should the Examiner believe that anything further is needed to place the application in even better condition for allowance, the Examiner is requested to contact applicant's undersigned representative at the telephone number below.

Respectfully submitted,

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